

What is claimed is:

1. 1. A device for use in molten metal, the device comprising:
 2. (a) a drive source;
 3. (b) a motor shaft having a first end and a second end, the first end being connected to the drive source;
 4. (c) a coupling having:
 5. (i) a first coupling member connected to the second end of the motor shaft; and
 6. (ii) a second coupling member for connecting to the first end of the rotor shaft;
 7. (d) a rotor shaft having a first end and a second end, the first end connected to the second coupling member; and
 8. (e) a rotor connected to the second end of the rotor shaft.
1. 2. The device of claim 1 wherein the device is a molten metal pump and the device further includes a pump casing including a pump chamber, an inlet and a discharge, wherein the rotor is positioned in the pump chamber.
1. 3. The device of claim 2 that further includes a metal-transfer conduit downstream of the discharge.
1. 4. The device of claim 3 wherein the device is a transfer pump.
1. 5. The device of claim 2 that further includes a gas-release device, the gas-release device having a first end connected to a gas source and a second end for releasing gas into molten metal.
1. 6. The device of claim 5 wherein the second end of the gas-release device is positioned downstream of the discharge.
1. 7. The device of claim 3 that further includes a gas-release device, the gas-release device having a first end connected to a gas source and a second end connected to the metal-transfer conduit.
1. 8. The device of claim 1 wherein the first coupling member has a cylindrical opening that receives the second end of the motor shaft.

- 1 9. The device of claim 1 wherein the second coupling member has an opening that receives the
- 2 first end of the rotor shaft.
- 1 10. The device of claim 9 wherein the second coupling member further includes apertures and
- 2 bolts in the apertures tightened to engage the first end of the rotor shaft, and a counterweight
- 3 on an exterior surface of the second coupling member, the counterweight opposite the
- 4 apparatus.
- 1 11. The device of claim 9 wherein the first end of the rotor shaft has two opposing flat surfaces and
- 2 two opposing curved surfaces and the opening in the second coupling has two opposing flat
- 3 surfaces and two opposing curved surfaces.
- 1 12. The device of claim 10 wherein the second coupling member further includes one or more
- 2 bolts, wherein each bolt includes a threaded shaft and a T-cap at the end of the threaded shaft,
- 3 the T-cap for pressing against the second end of the rotor shaft when the bolt is tightened.
- 1 13. A coupling for use in a molten metal pump having a motor shaft including a first end and a
- 2 second end, and a rotor shaft including a first end and a second end, the coupling comprising:
 - 3 (a) a first coupling member for connecting to the second end of the motor shaft; and
 - 4 (b) a second coupling member for connecting to the first end of the rotor shaft, a second
 - 5 coupling member having an external wall and an apparatus extending beyond the external wall,
 - 6 the apparatus for connecting the second coupling member to the second end of the rotor shaft.
- 1 14. A coupling for use in transferring gas in a molten metal device, the coupling including a
- 2 coupling member that comprises a bore having an opening, the bore for receiving an end of a
- 3 shaft, the bore having an end distal the opening and an end proximal the opening, wherein the
- 4 distal end is tapered and is not threaded.
- 1 15. The coupling of claim 14 wherein the proximal end is threaded.
- 1 16. The coupling of claim 15 wherein the threads are coarse threads.
- 1 17. The coupling of claim 14 that further includes a first coupling member and a passage between
- 2 the first coupling member and the second coupling member, the passage for transferring gas.

- 1 18. The coupling of claim 14 wherein the coupling is comprised of stainless steel.
- 1 19. The coupling of claim 14 wherein the surface of the distal end of the bore is smooth.
- 1 20. The coupling of claim 14 that further includes a counterweight.
- 1 21. A rotary degasser including:
 - 2 (a) a motor;
 - 3 (b) a motor shaft having a first end and a second end, the first end connected to the motor;
 - 4 (c) a coupling having a first coupling member and a second coupling member, the first
 - 5 coupling member connected to the second end of the motor shaft, the second coupling member
 - 6 comprising a bore having an opening, the bore for receiving an end of a rotor shaft, the bore
 - 7 having an end distal the opening and an end proximal the opening, the distal end being tapered
 - 8 and not threaded;
 - 9 (d) a rotor shaft having a first end and a second end, the first end being received in and
 - 10 connected to the second coupling member; and
 - 11 (e) a rotor connected to the second end of the rotor shaft.
- 1 22. The rotary degasser of claim 21 wherein there is a passage between the first coupling member and the second coupling member; the passage for transferring gas.
- 1 23. The rotary degasser of claim 21 wherein the proximal end of the second coupling member is threaded.
- 1 24. The rotary degasser of claim 23 wherein the threads are course threads.
- 1 25. The rotary degasser of claim 21 wherein the coupling is comprised of stainless steel.
- 1 26. The rotary degasser of claim 21 wherein the distal end of the bore has a smooth surface.
- 1 27. A rotor shaft including a generally smooth outermost perimeter, a first end and a second end, the first end for connecting to a coupling, the second end for connecting to a rotor, the first end having a smooth, tapered portion and threads between the smooth, tapered portion and the outermost perimeter.
- 1 28. The rotor shaft of claim 27 wherein the threads are 3/8" ACME course threads.

- 1 29. The rotor shaft of claim 27 wherein the rotor shaft is comprised of graphite.
- 1 30. A device for use in molten metal, the device comprising:
- 2 (a) a drive source;
- 3 (b) a motor shaft having a first end and a second end, the first end being connected to the drive
- 4 source;
- 5 (c) a coupling having:
- 6 (i) a first coupling member connected to the second end of the motor shaft; and
- 7 (ii) a second coupling member for connecting to the first end of the rotor shaft, wherein
- 8 there is no driving connection between the first coupling member and the second coupling
- 9 member; and
- 10 (d) a rotor shaft having a first end and a second end, the first end connected to the second
- 11 coupling; and
- 12 (e) a rotor connected to the second end of the rotor shaft.
- 1 31. The device of claim 30 wherein the coupling is a magnetic coupling.
- 1 32. The device of claim 30 wherein the coupling has a housing and the first coupling member and
- 2 second coupling member are each positioned inside the outer housing.
- 1 33. The device of claim 30 wherein the first coupling member comprises a conductor and the
- 2 second coupling member comprises one or more magnets.
- 1 34. The device of claim 30 wherein there is a gap between the first coupling member and the
- 2 second coupling member.
- 1 35. The device of claim 34 wherein the gap can be altered.
- 2 36. The device of claim 12 wherein the T-cap has a substantially flat surface of $\frac{1}{2}$ " diameter or
- 3 greater that presses against the rotor shaft when the bolt is tightened.
- 4 37. The device of claim 12 wherein the end of the T-cap that presses against the rotor shaft is not
- 5 threaded.